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August 15, 1930

BUREAU OF
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THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

OFFICE OF MYCOLOGY AND DISEASE SURVEY

Vol. XIV August 15, 1930 Number 16

FRUIT DISEASES

FIRE BLIGHT OF PEARS AND APPLES IN NEW YORK

By K. G. Parker

There has been a very severe outbreak of fire blight in apples in certain sections of New York State this year. It is probably more severe in central New York than elsewhere although orchards in the Champlain Valley and in certain parts of the Hudson Valley have been damaged considerably. Mr. A. B. Burrell reports the worst epiphytotic in the Champlain Valley in six years. The greater amount of the infection has been in the blossoms, although terminal infections have been serious in some places. The progress of the disease through the bark has generally stopped at present due to the recent dry weather. Among the varieties injured the most are Wealthy, Alexander, Tolman Sweet, Fameuse, Fall Pippin, King, Wolf River, Wagner, and Rhode Island Greening. Many other varieties are affected to a lesser extent, such as McIntosh, Baldwin, Dutchess, Northern Spy, and Yellow Transparent. Infections on the last named varieties have been chiefly in the blossoms and in few cases has the disease progressed into branches of any size. In many of the more susceptible varieties, as Wealthy and Alexander, branches several inches in diameter have been partly or entirely girdled.

Infections on pears have not been so general, but in some orchards the disease is very serious. One orchard in Wayne County observed by the writer had nearly 50 per cent of the blossom spurs affected. Pears in the Hudson Valley are probably affected worse than in other parts of the State. The most severe infections have been in Clapp's Favorite and Bartletts though some Seckel orchards had a large amount of blossom blight. Cankers in pears have appeared to some extent but their margins are not as definitely formed as in apples.

In general this has been the worst epiphytotic of fire blight in this State since 1925.

APPLE AND PEACH DISEASES IN THE LOWER VALLEY AND PIEDMONT SECTIONS OF VIRGINIA

APPLE

Scab (Venturia inaequalis). Can hardly be found in sprayed orchards and only very light infections on unsprayed trees.

Bitter rot (Glomerella cingulata). Has not been seen this season.

Cedar rust (Gymnosporangium juniperi-virginianae). Due to the very thorough cutting of cedar trees in the lower Valley section this disease has been reduced to a minimum.

PEACH

Brown rot (Sclerotinia fructicola). Has only been observed on unsprayed trees. The infection even on unsprayed trees is very light.

Scab (Cladosporium carpophilum). Has only been observed on unsprayed trees. The infection even on unsprayed trees is very light.

Bacteriosis (Bacterium pruni). Has not been observed this season on peach.

Arsenical injury. Quite general in most peach orchards on foliage, but no twig injury has been observed. This injury is due to the very heavy applications of lead arsenate.

(R. H. Hurt, July 25)

OTHER APPLE DISEASES

Fire blight (Bacillus amylovorus)

Connecticut: Very prevalent this year, damage light except on young trees. (E. M. Stoddard, Aug. 1)

Wisconsin: More than last year. Widespread occurrence. (R. E. Vaughan, July 15)

Scab (Venturia inaequalis)

Wisconsin: Late infection very general. Unsprayed and poorly sprayed fruit of little value. (R. E. Vaughan, July 15)

PEACH AND PEAR DISEASES IN CONNECTICUT

PEACH

Spray injury. Occurs where arsenate of lead was used either in dust or spray, causing defoliation and injury to bark of young twigs. Common. (E. M. Stoddard, Aug. 1)

PEAR

Fire blight (Bacillus amylovorus). Common but perhaps no more than usual, not severe except in a few cases. (E. M. Stoddard, Aug. 1)

CITRUS CANKER IN TEXAS

An infection of citrus canker has been discovered in a nursery at Telferner, Victoria County, Texas. Five grapefruit trees and 15,000 two-year old Citrus trifoliata were immediately destroyed. This is the first infection reported from Texas since February, 1929. (K. F. Kellerman, Aug. 6)

RASPBERRY DISEASES IN MASSACHUSETTS

During the month of July the following diseases of raspberry were observed by O. C. Boyd.

Bluestem (Verticillium alboatrum) in only one planting in Hampden County.
Cane blight (Leptosphaeria coniothyrium) general.
Anthracnose (Plectodiscella veneta) Hampden and Hampshire Counties.
Mosaic is common as usual and leaf curl was observed in one planting.

BLACK ROT OF GRAPES

Massachusetts: Black rot (Guignardia bidwellii) first observed July 2 on unsprayed plants. As season advances it seems to be growing serious. (W. H. Davis, Aug. 1)

Connecticut: Quite prevalent this year but well controlled where trees were sprayed. (E. M. Stoddard, Aug. 1)

Ohio: I find black rot of grapes at Yellow Springs (Greene County) quite serious. (E. W. Mendenhall, July 28)

CEREAL DISEASES

BREAKING OVER OF WHEAT STRAW

By R. J. Haskell

A breaking over of wheat straw has caused considerable concern among farmers in some of the spring wheat states this year. The straw became weakened at a point usually immediately above the second note and fell over. Affected fields had somewhat the appearance of being hit by wind or hail. In fact it was regarded as hail injury by some and it is understood that in some cases

hail insurance was collected. The evidence indicates however that neither of these factors were responsible. Some weakness in the straw, the reason for which does not seem to be understood, seemed to be the immediate cause. The culms did not usually break at the point of bending but continued growth with the result that they resumed their upward growth at one of the nodes higher up. This resulted in a right-angle bend in the culm with the head at a low level in the field. This condition resembles what has been called "crinkle joint". It is understood however that in true crinkle joint the culms bend over at the node rather than at the internode and usually do not regain the upright position.

The loss from this damage occurred principally in two ways. First the lodging of the straw with the consequent loss of heads during harvesting, and, second the failure of the heads to fill normally. It was rather surprising to note however that in many cases the heads were fairly well filled and would make somewhat of a yield provided they could be successfully gathered and threshed. As high as 40 per cent crinkled straws was noted in one field. I noted this injury in North and South Dakota and Minnesota and in all of these states the growers were commenting on it.

The injury must have occurred sometime in early June. It was worse in some varieties than in others. The hard red spring wheats rather than the durums being more affected as a class. (Aug. 4)

WHEAT MOSAIC IN KANSAS

By L. E. Melchers and Hurley Fellows

On June 16, the writers made an inspection tour over western Kansas for the purpose of investigating the foot rot diseases of wheat. The county agents of Rawlins and Sheridan Counties had been receiving complaints about "poor wheat fields," but the cause was not apparent. A visit to these fields by the writers indicated rather strongly the presence of wheat mosaic. Material was sent to H. H. McKinney for examination. He reports as follows: "I find definite cell inclusions in considerable abundance. These resemble those associated with wheat mosaic east of the Mississippi River. I am inclined to believe that a mosaic virus is causing at least part of the trouble around Atwood and I shall not be surprised if the trouble turns out to be the same as our eastern wheat mosaic."

While this is not the first record of its appearance in Kansas, it is the first report of actual damage. The county agents claim thousands of acres were affected. We saw several hundred acres of wheat which showed this condition. Some of these fields were being plowed up as they were almost a complete loss.

In the spring of 1929, a few stunted wheat plants showing a yellow mottling were found in the agronomy nursery of the Kansas Agricultural Experiment Station, Manhattan, Kansas. This was the first record of its appearance. It was present again at Manhattan in June, 1930.

Cooperative studies between the Department of Botany and Plant Pathology of the Kansas State Agricultural College and the Office of Cereal Crops and Diseases are under way to discover the factors involved in this problem in Kansas.

CEREAL DISEASES IN WISCONSIN

BARLEY

Loose smut (Ustilago nuda). Widespread and destructive in many fields. Smooth awned strains of barley seem to be especially susceptible. We greatly need a treatment for loose smut that is better and more easily applied than hot water.

Covered smut (Ustilago hordei). Not destructive. Rarely observed in most fields.

Scab (Gibberella saubinetii). Widespread in southern and western counties. Mostly on lodged grain and where plowing was poorly done or grain seeded on disked land. Little varietal difference in susceptibility.

Stripe (Helminthosporium gramineum). The new Wisconsin introductions of barbless barley Nos. 37 and 38 are very highly stripe resistant. Many of the older barley strains are very susceptible. Stripe has been well controlled by Ceresan and Corona Oat Dust fortified with some mercury compound.

Rusts (Puccinia simplex and P. graminis). A small amount of rust was evident on barley at harvest. Little damage was evident.

OATS

Crown rust (Puccinia coronata). Less than usual, but severe on some late oats. Considerable early spread near buckthorn (Rhamnus).

Loose and covered smuts (Ustilago avenae and U. levis). Well controlled by Formaldehyde, Ceresan, or Corona Oat Dust when properly applied. Varying amounts in untreated seed up to 15 per cent of heads. More than last but less than two years ago.

Stem rust (Puccinia graminis). Much less than usual.

RYE

Leaf and stem rusts (Puccinia dispersa and P. graminis). Rye was harvested before rust caused any evident losses.

Ergot (Claviceps purpurea). About as usual. Only a small amount evident.

(R. E. Vaughan, July 15)

DISEASES OF VEGETABLE CROPS

VEGETABLE DISEASES IN NEW YORK

Bacterial soft rot (Bacillus carotovorus). Because of the extremely high temperatures this season there seems to be an increased amount of bacterial soft rot on all types of vegetables. It has been observed on pepper fruit,

tomato fruit, cabbage, carrots, and potato tubers that had previously suffered from injury. No large losses were reported in any case.

Mosaic on cucumbers and tomatoes and streak on tomatoes. For many years the greenhouse growers at Irondequoit, Monroe County, New York, have had great losses in their greenhouses from the above named diseases and an intensive campaign was undertaken to have the growers destroy the host weeds that are found on their farms and in the yards about their greenhouses. Last week three days were spent in visiting more than 20 of these greenhouses and making a survey of their diseased condition and it was found that only 4 had any mosaic on their tomatoes or cucumbers. These were men whose greenhouses were near arborvitae wind hedges where the weed hosts grew unobserved. The remainder were entirely free from the trouble.

Fusarium wilt of muskmelon. A rather characteristic disease of muskmelon was observed in a number of fields, ranging from a trace to 1 per cent. Most of these fields were in Monroe County, although apparently the same trouble is present in other parts of the State. The symptoms on the vine first show a stunting or a yellowing of the plant and later the vine begins to wilt. About this time a streak may occur along one side of the vine for a short distance or for nearly the entire length of any vine. The streak is whitish to yellowish in color. In some cases there is no definite streak but the vine cracks open and the sap oozes out so that it collects in amber drops in many places on the affected stem. The symptoms are very similar to those brought about when lightning strikes a spot in the field. In these cases, however, the affected plants were found singly scattered throughout the entire field. When isolations were made a pure culture of Fusarium was obtained. No cross inoculations have yet been made to determine the pathogenicity. I have never observed these particular symptoms in New York State before but Dr. Mel T. Cook in Phytopathology 13: 462-463. 1923, apparently describes the same disease.

(Charles Chupp, Aug. 6)

VEGETABLE DISEASES IN MASSACHUSETTS

TOMATO

Leaf spot (Septoria lycopersici). Unusually prevalent this year so early in the season. It was observed in Bristol County, July 11, where it occurred on the lower leaves in several fields. By July 22, it had caused considerable defoliation in some of the more heavily infected plantings. On the latter date, it was observed also in Plymouth and Middlesex Counties. It seems to be common throughout the Boston Market Garden section.

Early blight (Alternaria solani). Although this disease was first observed in the field on June 28 (Hampshire County) and is more generally distributed over the State than Septoria leaf spot, it is causing far more damage to the plants than the early blight.

Bacterial canker (Aplanobacter michiganense). First observed this year June 21 on the local market in fruit reported to be shipped from the south, with internal infection only. On July 10, I observed it in the field in Bristol County where at least 50 per cent of the plants in one small field were badly affected. Since that date, the disease has been observed in Hampden County and reported from Franklin County. It seems to be most prevalent in the heavy

tomato-growing section of Bristol County where too little attention is given to plant bed sanitation and source of seed.

Wilt (Fusarium lycopersici). Common in the Bristol County plantings and has been observed in two fields in Hampden County. It was first observed this year July 12 in Hampden County.

(O. C. Boyd, July 28)

CABBAGE

Black leaf spot (Alternaria brassicae). Quite common on lower leaves of cabbage, earlier than usual.

Club root (Plasmodiophora brassicae). Especially bad this year on infected soil.

(W. H. Davis, Aug. 1)

CHINESE CABBAGE

Club root (Plasmodiophora brassicae). Especially bad on infected soil. I saw one small area where the crop was entirely lost, not a single plant was healthy. (W. H. Davis, Aug. 1)

EGGPLANT

Leaf spot (Alternaria solani). Several plants bore leaves with well developed symptoms. These plants were conspicuous by being "stunted" in size. An Alternaria was sporulating abundantly and tissue-cultures gave an Alternaria. (W. H. Davis, Aug. 1)

VEGETABLE DISEASES IN PENNSYLVANIA

CABBAGE

Club root (Plasmodiophora brassicae). A few fields were observed with heavy infections.

Black rot (Bacterium campestre). More severe than usual in Philadelphia County. The worst cases indicate seed infection. Other crucifers exhibit like infections.

RHUBARB

Crown rot (Phytophthora cactorum). This is the first importance occurrence of the disease since 1923. The same farms are involved as in the years 1920-1923. It is most severe in new plantings.

(W. S. Beach, Aug.)

SWISS CHARD

Leaf spot (Cercospora beticola). During a recent visit to Pike County, I visited a truck gardener who was growing Swiss chard. I found that this crop was severely attacked with this disease. The leaves were so severely damaged that fully 75 per cent of the crop was not marketable. (G. L. Zundel, July 29)

VEGETABLE DISEASES IN VIRGINIA

TOMATO

Blossom-end rot (Dry weather). Very severe in southwest Virginia at the present time. In home gardens in Blacksburg 75 to 90 per cent of the fruits are affected. There has been practically no rain in this particular vicinity since March. (S. A. Wingard, August 1)

CABBAGE

Yellows (Fusarium conglutinans). Some fields in southwest Virginia are severely injured. Many of the growers were unable to obtain seed of resistant varieties this year. (R. G. Henderson)

VEGETABLE DISEASES IN WISCONSIN

PEA

Root rot (Aphanomyces euteiches). About as usual. General on old pea fields where drainage is poor.

Wilt (Fusarium otherocerus). Old fields in central canning section heavily infested. Scattering plants found in other sections. Infection may be distributed with seed. Some strains of Alaskas show 75 per cent resistance. All Hosford and Perfection strains susceptible. Extensive variety trial at Waupun.

CABBAGE

Black-rot (Bacterium campestre). Great variation in amount of black-rot on same variety of seed from different sources. Fields in general very free from black-rot.

Club-root (Plasmodiophora brassicae). Specimens received from Brown, Outagamie, Racine, Kenosha and Dane Counties.

Yellows (Fusarium conglutinans). More than for several years. New locations observed near Madison. Resistant selections of Dr. Walker very satisfactory.

Lightening. Field near Madison shows plants all killed in circular area 100 feet in diameter. Symptoms show bursting of stem and burning just above ground line.

SNAP BEANS

Blight (Phytomonas phaseoli). Widespread and will curtail crop in some fields.

Anthracnose (Colletotrichum lindemuthianum). Not seen or reported to date. Too dry.

(R. E. Vaughan, July 15)

TIPBURN OF POTATO IN CONNECTICUT

Tipburn is becoming increasingly prevalent and severe with the continuance of dry hot weather. Bordeaux spraying shows good control so far. (E. M. Stoddard, August 1)

FUSARIUM WILT OF WATERMELON IN MICHIGAN

Dr. Philip Luginbill of Monroe, Michigan, visited the D. M. Ferry Seed Farm, Rochester, Michigan, on July 31, where he found the watermelon plants in a dying condition, in fact many had already died. Some of the affected plants were sent to Dr. R. J. Haskell, who identified the disease as Fusarium wilt.

DISEASES OF SPECIAL CROPS

TOBACCO DISEASE SURVEY IN WEST VIRGINIA

By C. R. Orton

I visited the chief tobacco districts of West Virginia which are located in Mason, Cabell, Wayne and Putnam Counties in the southwestern part of the State. In these districts which are somewhat scattered there are numerous tobacco growers who plant about 2 acres on the average. The largest field is about 6 acres and there are many small patches of one-half acre or less.

Much of the tobacco was planted late because of the dry weather in the spring which delayed the growth of seedlings, and the total acreage planted was somewhat reduced because of the shortage of plants.

Unprecedented drought conditions followed setting the plants and continued to the present time. The result has been that only where early planting was practiced and the plants were set wet, has the tobacco any chance of producing somewhere near one-half an average crop. In my opinion there is about 20 per cent of the acreage which will produce about 40 per cent of the normal crop. The remaining 80 per cent will not produce more than 15 to 20 per cent of a normal crop even if rains come at once to help it along. In case the rain fails altogether this 80 per cent of the acreage will not produce 10 per cent of a normal crop. There are many acres on the dry hills and ridges which will not be harvested. A very important factor this year has been humus. Where heavy sod or green cover crops were turned under the tobacco is much better.

The "stand-up" types like Judys Pride and Kelly are suffering more from dry weather than the "drooping" types like Lockwood. Apparently the only reason for this is the shading which the latter type produces and which aids in conserving the soil moisture.

Some damage was done by "scald" which appeared throughout the districts last Monday, July 28, when the temperature reached 111 degrees in Mason County and was from 108 to 110 throughout the area. This took the form of burning of the opened top leaves and was typical of this sort of injury.

By far the most damage by parasites has been caused by the flea beetle which was severe in the seed beds and has persisted unchecked throughout the

season. Seventy-five to 100 per cent infection was present in every field and the damage will be very high because practically all of the leaves are severely punctured. This condition has also greatly aggravated the injury from drought.

Plant diseases were practically nil with the exception of mosaic which was severe in one or two fields and mild in a few other patches. No reason for the high per cent of mosaic in these two instances and its general absence in other fields is offered. There was no evidence of mosaic in the seed beds in either case. Ring spot was found in one plant in one field and "frenching" was also found in one field. Wilt was present in small amounts in two fields in Mason County. Traces of root rot were found in a few fields but could not be claimed to be causing appreciable damage.

No other diseases were noted. Tobacco worm was seen in almost every field but the damage was not more than 2 per cent. This is one pest which the West Virginia tobacco grower recognizes and fights.

I am of the opinion that the survey this year does not give anything like a normal pathologic picture. I feel certain that root rot and many other diseases have been highly restricted by the drought conditions. On the other hand flea beetle injury has apparently been greatly aggravated by the dry conditions. (July 27-31)

TOBACCO SEED-BED SURVEY IN WISCONSIN

By James Johnson

The tobacco seed-bed survey was started about May 20 and continued at intervals until June 14. The transplanting season in Wisconsin was largely between June 9 and June 18; consequently being about a week to ten days earlier than normal for this State. Frequent rains during the transplanting period delayed the work considerably.

In the southern Wisconsin tobacco district, Blackfire (Angular leaf-spot) was very common in the seed-beds. It is estimated that over 50 per cent of the seed-beds were more or less affected. In some cases the leaves on the young seedlings were so heavily "blighted" as to produce the appearance of frost injury. Some frost injury did occur in spots at about the same time and the growers generally erroneously attributed the condition to frost. If weather conditions are favorable for blackfire to occur in the field, southern Wisconsin should experience a heavy infection this year, judging by the amount of inoculum which must be present in the fields.

Wildfire was found in seventeen tobacco seed-beds. Since this disease was searched for on farms where it was previously known to occur, it probably represents nearly one-half of the infections actually in the State. In other words, wildfire probably exists in considerably less than one-half of one per cent of the seed-beds in the State. In this connection, however, it should be remembered that for the past eight years special effort has been made in most cases to eliminate this disease from "infested" farms.

Practically all tobacco seed-beds in Wisconsin are steam sterilized; consequently we would not expect to find much disease from overwintering soil parasites. Judging by the condition of the plants in two or three unsteamed beds seen, and in small unsteamed parts of steamed beds, it is believed that damping-off or bed-rot would have been very rampant this year but for the steaming process.

No mosaic symptoms were noted in any of the seed-beds examined. Black root-rot was found to cause damage in only one seed-bed, which was unsteamed.

An inspection trip through the northern Wisconsin tobacco district on June 5 and 6 revealed comparatively little signs of disease. The month of May having been comparatively dry in that area, probably accounts for the healthy condition of the plants. (August 1930)

TOBACCO SEED-BED SURVEY IN MARYLAND

Table 21. Summary of Wildfire conditions.

County	Total Inspections	No. beds free from Wildfire	No. beds in which Wildfire was found
Anne Arundel	10	9	1
Calvert	37	17	20
Charles	36	34	2
Prince Georges	8	5	3
St. Marys	10	10	0
	101	75	26

It will be noted that Wildfire was found in twenty-six out of one hundred one beds inspected, in spite of the unusually dry spring. This is a larger number than we expected to find and indicates that spraying the seed beds for the prevention of the disease should be adopted as a regular practice by all of the tobacco growers in Maryland. The beds should be sprayed to save the plants and to avoid transplanting to the fields plants infected with Wildfire. Our survey indicates that in most cases the disease was brought into the beds where they were weeded, since infections were most frequently found beginning on the outer edges, although there were a few instances where evidences of seed infection were strong.

The largest proportions of infected beds were found in Calvert and Prince Georges Counties, the two counties in which the disease first appeared and in which it has become best established. No infected beds were found in St. Marys County, the last county in which the disease appeared. (R. A. Jehle, July 20)

TOBACCO DISEASES IN MASSACHUSETTS

Wildfire (Bacterium tabacum). Since the last report on this disease (June 25) wildfire has been observed in a number of fields in Franklin County, to a less extent in Hampshire County, and in only two fields in Hampden County. In all cases, it occurred in Havana tobacco, and in most cases, its origin was suspected to be in the bed, others pointing to field origin. Sections with the heaviest infection seem to have observed the least care in bed treatment, i.e., soil sterilization and plant protection. Although weather conditions did not favor its development in the bed generally, we have had rather favorable conditions throughout the Valley since the middle of May. (Davis, Boyd, and Kightlinger, July 28)

Angular leaf spot (Bacterium angulatum). Since the first observance of this disease on May 24, it has been found in three additional fields on July 7

and 26. On the last two dates, two fields of the same locality in Franklin County showed heavy infection of the lower leaves. (Boyd and Davis, July 28)

DISEASES OF TREES AND ORNAMENTALS

DISEASES OF TREES IN CONNECTICUT

ELM

Black-spot (Gnomonia ulmea). More prevalent than usual this year, causing considerable defoliation on trees in several localities.

MOUNTAIN ASH

Fire Blight (Bacillus Amylovorus). Unusual, two reports.

MAPLE

Wilt (Verticillium sp.) One report.

(E. M. Stoddard, August 1, 1930.)

TOBACCO RINGSPOT OF PETUNIA IN VIRGINIA

Tobacco ringspot (virus). Natural infection of petunia (Petunia violacea) with tobacco ringspot was first observed on June 12, on a few plants growing in an open flower bed in Pittsylvania County. The disease was again observed, July 22, on a dozen or more plants of petunia growing in a bed on a lawn in Washington County. The source of infection could not be determined. The writer has unpublished data obtained in greenhouse tests last winter that show that the tobacco ringspot virus is seed borne in petunia. In these tests about 20 per cent of the seedlings grown from infected seed developed the disease. (R. G. Henderson, July 23, 1930)

POWDERY MILDEW OF ROSE IN CONNECTICUT

Powdery Mildew (Sphaerotheca pannosa). Very prevalent this year, perhaps a little more than usual. (E. M. Stoddard, August 1, 1930.)

SOME SPECIMENS RECEIVED

Bacillus amylovorus on Cotoneaster pannosa, Phoenix, Maricopa County, Arizona, July 23, D. C. George.

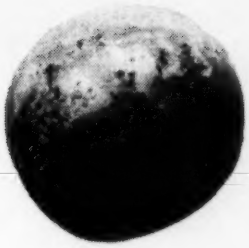
Ustilago oxalidis on Oxalis corymbosa, Wooster, Wayne County, Ohio, July 3, George L. Zundel.

BACTERIAL CANKER OF TOMATOES--PLATES

Plates 6 and 7 were originally planned to accompany the report on "Bacterial Canker of Tomato" by L. M. Fenner in the preceding number of the Reporter (Vol. XIV, No. 15, August 1, 1930) but were not completed in time. It is suggested that in binding they be placed between pages 139 and 140 following the map.)

PLATE 6

a



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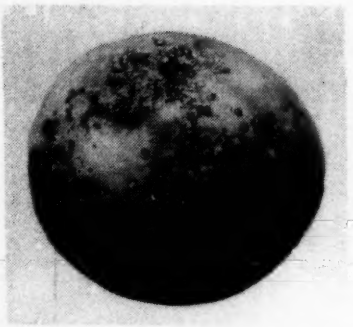

c

d

Bacterial canker lesions on fruits of Gulf States Market variety; the result of wind-rain blown bacteria.
(a) Side view of ripe tomato with moderate to severe infection.
(b) Blossom-end view of fruit with severe infection; note the coalesced lesions.
(c) Blossom-end view of fruit with lesions largely on one side.
(d) Similar view of a fruit with severe infection on two-thirds of the epidermis. The light pale-green halo of water-soaked tissue can be seen outer edge of many lesions. Younger lesions have a corky-brown color which darkens gradually with the age of the fruit. Rain-blown bacteria from a southernly direction caused infection on these fruits; the opposite side of the fruits was entirely or almost free of canker lesions. Graves' farm, June 6, 1929.

PLATE 7

Advanced stage of canker showing small open cankers on stem above the second fruit cluster. Very few fruit lesions on top cluster but severe infection on the lower fruits and fruit spures. Rapid drying out of infected petioles and leaflets was noted in 1929 following favorable moisture conditions for systemic infection. Graves' farm, June 6, 1929.